AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-74. (Canceled without prejudice or disclaimer).

75. (Previously Presented) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film, wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

a magnetic field forming means for forming a magnetic field designed to generate increased plasma density at a portion within an outer periphery of said sample which is greater than the plasma density at the center of said sample by continuously rotating the magnetic field to generate the increased plasma density at the portion within the outer periphery of the sample,

means for etching a fine pattern on said sample by applying a high-frequency electric power of between only 30 MHz and 300 MHz between said pair of electrodes, and for setting the gap between said pair of electrodes of between only 30 mm and 100 mm, and for setting an atmospheric pressure inside said vacuum

processing chamber of between only 0.4 Pa and 4.0 Pa, and for setting the magnetic field value only to a value smaller than 30 gauss, in order to maintain a plasma density within a range of between 5 x 10^{10} cm^{-3} and 5 x 10^{11} cm^{-3} between said pair of electrodes to etch a fine pattern on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

76. (Previously Presented) An apparatus as in claim 75, wherein said vacuum processing chamber improves workability on a sample at a plasma density within a range of between 5 x 10^{10} cm^{-3} and 5 x 10^{11} cm^{-3}.

77. (Previously Presented) An apparatus as in claim 75, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

78. (Previously Presented) An apparatus as in claim 76, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

79. (Previously Presented) An apparatus according to claim 75, wherein said magnetic field forming means includes means to set the magnetic field intensity on the sample to be less than 30 gauss.

80. (Previously Presented) An apparatus according to claim 75, wherein said fine pattern is 0.2 µm or smaller.

81. (Previously Presented) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film, wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

a magnetic field forming means, including two pairs of coils for forming a magnetic field designed to generate increased plasma density at a portion within an outer periphery of said sample which is greater than the plasma density at the center of said sample by successively switching the direction of the magnetic field in each of the pairs of coils to rotate the magnetic field, wherein the position and diameters of the coils are set to generate the increased plasma density at the portion of the outer periphery of the sample,

means for etching a fine pattern on said sample by applying a high-frequency electric power of between only 30 MHz and 300 MHz between said pair of electrodes, and for setting the gap between said pair of electrodes of between only 30 mm and 100 mm, and for setting an atmospheric pressure inside said vacuum processing chamber of between only 0.4 Pa and 4.0 Pa, and for setting the magnetic

field value only to a value smaller than 30 gauss, in order to maintain a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3} between said pair of electrodes to etch a fine pattern on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

82. (Previously Presented) An apparatus as in claim 81, wherein said vacuum processing chamber improves workability on a sample at a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3}.

83.(Previously Presented) An apparatus as in claim 81, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

84. (Previously Presented) An apparatus as in claim 82, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

85. (Previously Presented) An apparatus according to claim 81, wherein said magnetic field forming means includes means to set the magnetic field intensity on the sample to be less than 30 gauss.

86. (Previously Presented) An apparatus according to claim 81, wherein said fine pattern is 0.2 μm or smaller.

87. (Previously Presented) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film, wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

a magnetic field forming means, including a pair of coils, for forming a magnetic field designed to generate increased plasma density at a portion within an outer periphery of said sample which is greater than the plasma density at the center of said sample by arranging the pair of coils so that the magnetic flux created by one of the coils cancels the magnetic flux of the other of the coils at the center of the sample and superposes on the magnetic flux of the other of the coils at the portion within the outer periphery of the sample,

means for etching a fine pattern on said sample by applying a high-frequency electric power of between only 30 MHz and 300 MHz between said pair of electrodes, and for setting the gap between said pair of electrodes of between only 30 mm and 100 mm, and for setting an atmospheric pressure inside said vacuum processing chamber of between only 0.4 Pa and 4.0 Pa, and for setting the magnetic field value only to a value smaller than 30 gauss, in order to maintain a plasma

density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3} between said pair of electrodes to etch a fine pattern on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

88. (Previously Presented) An apparatus as in claim 87, wherein said vacuum processing chamber improves workability on a sample at a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3}.

89. (Previously Presented) An apparatus as in claim 87, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

90. (Previously Presented) An apparatus as in claim 88, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

91. (Previously Presented) An apparatus according to claim 87, wherein said magnetic field forming means includes means to set the magnetic field intensity on the sample to be less than 30 gauss.

92. (Currently Amended) An apparatus according to claim ~~81~~ 87, wherein said fine pattern is 0.2 μm or smaller.

93. (Previously Presented) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film, wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

a magnetic field forming means for forming a magnetic field designed to generate increased plasma density at a portion within an outer periphery of said sample which is greater than the plasma density at the center of said sample by rotating an eccentrically arranged core of the magnetic field forming means to generate the increased plasma density at the portion within the outer periphery of the sample,

means for etching a fine pattern on said sample by applying a high-frequency electric power of between only 30 MHz and 300 MHz between said pair of electrodes, and for setting the gap between said pair of electrodes of between only 30 mm and 100 mm, and for setting an atmospheric pressure inside said vacuum processing chamber of between only 0.4 Pa and 4.0 Pa, and for setting the magnetic field value only to a value smaller than 30 gauss, in order to maintain a plasma

density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3} between said pair of electrodes to etch said fine pattern on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

94. (Previously Presented) An apparatus as in claim 93, wherein said vacuum processing chamber improves workability on a sample at a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3}.

95. (Previously Presented) An apparatus as in claim 93, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

96. (Previously Presented) An apparatus as in claim 94, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

97. (Previously Presented) An apparatus according to claim 93, wherein said magnetic field forming means includes means to set the magnetic field intensity on the sample to be less than 30 gauss.

98. (Previously Presented) An apparatus according to claim 93, wherein said fine pattern is 0.2 μm or smaller.